Parameters	Range	Installed system [1] minimum accuracy (to recovered data)	Sampling interval (per second)	Resolution [3] read out
Vertical acceleration	−3g to +6g	±0.2g in addition to ±0.3g maximum datum.	4 (or 1 per second where peaks, ref. to 1g are recorded).	0.05g.
Longitudinal acceleration	±1.0g	±1.5% max. range excluding datum error of ±5%.	2	0.03g.
Pitch attitude	100% of usable range	±2°	1	0.8°.
Roll attitude	±60° or 100% of usable range, whichever is greater.	±2°	1	0.8°.
Altitude rate	±8,000 fpm	±10% Resolution 250 fpm below 12,000 ft. indicated.	1	250 fpm below 12,000.
Engine Power, Each Engine				
Main rotor speed	Maximum range	±5%	1	1% [2]
Free or power turbine	Maximum range	+5%	1	1% [2]
Engine torque	Maximum range	±5%	1	1% [2]
Flight Control—Hydraulic Pressure				
Primary (discrete)	High/low		1.	
Secondary—if applicable (discrete).	High/low		1.	
Radio transmitter keying (discrete).	On/off		1.	
Autopilot engaged (discrete)	Engaged or disengaged		1.	
SAS status—engaged (discrete).	Engaged/disengaged		1.	
SAS fault status (discrete)	Fault/OK		1.	
Flight Controls				
Collective [4]	Full range	±3%	2	1% [2]
Pedal Position [4]	Full range	±3%	2	1% [2]
Lat. Cyclic [4]	Full range	±3%	2	1% [2]
Long. Cyclic [4]	Full range	±3%	2	1% [2]
Controllable Stabilator Position [4].	Full range	±3%	2	1% [2]

[1] When data sources are aircraft instruments (except altimeters) of acceptable quality to fly the aircraft the recording system excluding these sensors (but including all other characteristics of the recording system) shall contribute no more than half of the values in this column.
[2] Per cent of full range.
[3] This column applies to aircraft manufactured after October 11, 1991.
[4] For all aircraft manufactured on or after December 6, 2010, the sampling interval per second is 4.

[Doc. No. 25530, 53 FR 26152, July 11, 1988; 53 FR 30906, Aug. 16, 1988, as amended by Amdt. 135–69, 62 FR 38397, July 17, 1997; Amdt. 135–113, 73 FR 12570, Mar. 7, 2008; 73 FR 15281, Mar. 21, 2008; Amdt. 135–121, 75 FR 17047, Apr. 5, 2010]

Appendix D to Part 135—Airplane Flight Recorder Specification

Parameters	Range	Accuracy sensor input to DFDR readout	Sampling interval (per second)	resolution [4] read out
Time (GMT or Frame Counter) (range 0 to 4095, sampled 1 per frame).	24 Hrs	±0.125% Per Hour	0.25 (1 per 4 seconds).	1 sec.
Altitude	−1,000 ft to max certificated altitude of aircraft.	±100 to ±700 ft (See Table 1, TSO-C51a).	1	5′ to 35′ [1].
Airspeed	50 KIAS to V_{so}, and V_{so} to 1.2 V_D.	±5%, ±3%	1	1kt
Heading	360°	±2°	1	0.5°
Normal Acceleration (Vertical)	−3g to +6g	±1% of max range excluding datum error of ±5%.	8	0.01g
Pitch Attitude	±75°	±2°	1	0.5°
Roll Attitude	±180°	±2°	1	0.5°.
Radio Transmitter Keying	On-Off (Discrete)		1	
Thrust/Power on Each Engine	Full range forward	±2%	1 (per engine)	0.2% [2].
Trailing Edge Flap or Cockpit Control Selection.	Full range or each discrete position.	±3° or as pilot's indicator	0.5	0.5% [2].
Leading Edge Flap on or Cockpit Control Selection.	Full range or each discrete position.	±3° or as pilot's indicator	0.5	0.5% [2].

Parameters	Range	Accuracy sensor input to DFDR readout	Sampling interval (per second)	resolution [4] read out
Thrust Reverser Position	Stowed, in transit, and reverse (discretion).		1 (per 4 seconds per engine).	
Ground Spoiler Position/ Speed Brake Selection.	Full range or each discrete position.	±2% unless higher accuracy uniquely required.	1	0.22 [2].
Marker Beacon Passage	Discrete		1	
Autopilot Engagement	Discrete		1	
Longitudinal Acceleration	±1g	±1.5% max range excluding datum error of ±5%.	4	0.01g.
Pilot Input And/or Surface Position-Primary Controls (Pitch, Roll, Yaw) [3].	Full range	±2° unless higher accuracy uniquely required.	1	0.2% [2].
Lateral Acceleration	±1g	±1.5% max range excluding datum error of ±5%.	4	0.01g.
Pitch Trim Position	Full range	±3% unless higher accuracy uniquely required.	1	0.3%[2].
Glideslope Deviation	±400 Microamps	±3%	1	0.3% [2].
Localizer Deviation	±400 Microamps	±3%	1	0.3% [2].
AFCS Mode And Engagement Status.	Discrete		1	
Radio Altitude	−20 ft to 2,500 ft	±2 Ft or ±3% whichever is greater below 500 ft and ±5% above 500 ft.	1	1 ft + 5% [2] above 500′.
Master Warning	Discrete		1	
Main Gear Squat Switch Status.	Discrete		1	
Angle of Attack (if recorded directly).	As installed	As installed	2	0.3% [2].
Outside Air Temperature or Total Air Temperature.	−50 °C to +90 °C	±2° c	0.5	0.3° c
Hydraulics, Each System Low Pressure.	Discrete		0.5	or 0.5% [2].
Groundspeed	As installed	Most accurate systems installed (IMS equipped aircraft only).	1	0.2% [2].
If additional recording capacity is available, recording of the following parameters is recommended. The parameters are listed in order of significance:				
Drift Angle	When available. As installed.	As installed	4	
Wind Speed and Direction	When available. As installed.	As installed	4	
Latitude and Longitude	When available. As installed.	As installed	4	
Brake pressure/Brake pedal position.	As installed	As installed	1	
Additional engine parameters:				
EPR	As installed	As installed	1 (per engine)	
N [1]	As installed	As installed	1 (per engine)	
N [2]	As installed	As installed	1 (per engine)	
EGT	As installed	As installed	1 (per engine)	
Throttle Lever Position	As installed	As installed	1 (per engine)	
Fuel Flow	As installed	As installed	1 (per engine)	
TCAS:				
TA	As installed	As installed	1	
RA	As installed	As installed	1	
Sensitivity level (as selected by crew).	As installed	As installed	2	
GPWS (ground proximity warning system).	Discrete		1	
Landing gear or gear selector position.	Discrete		0.25 (1 per 4 seconds).	
DME 1 and 2 Distance	0–200 NM;	As installed	0.25	1mi.
Nav 1 and 2 Frequency Selection.	Full range	As installed	0.25.	

[1] When altitude rate is recorded. Altitude rate must have sufficient resolution and sampling to permit the derivation of altitude to 5 feet.

[2] Per cent of full range.

[3] For airplanes that can demonstrate the capability of deriving either the control input on control movement (one from the other) for all modes of operation and flight regimes, the ''or'' applies. For airplanes with non-mechanical control systems (fly-by-wire) the ''and'' applies. In airplanes with split surfaces, suitable combination of inputs is acceptable in lieu of recording each surface separately.

[4] This column applies to aircraft manufactured after October 11, 1991.

[Doc. No. 25530, 53 FR 26153, July 11, 1988; 53 FR 30906, Aug. 16, 1988]

APPENDIX E TO PART 135—HELICOPTER FLIGHT RECORDER SPECIFICATIONS

Parameters	Range	Accuracy sensor input to DFDR readout	Sampling interval (per second)	Resolution [2] read out
Time (GMT)	24 Hrs	±0.125% Per Hour	0.25 (1 per 4 seconds).	1 sec
Altitude	−1,000 ft to max certificated altitude of aircraft.	±100 to ±700 ft (See Table 1, TSO-C51a).	1	5′ to 30′.
Airspeed	As the installed measuring system.	±3%	1	1 kt
Heading	360°	±2°	1	0.5°.
Normal Acceleration (Vertical)	−3g to +6g	±1% of max range excluding datum error of ±5%.	8	0.01g
Pitch Attitude	±75°	±2°	2	0.5°
Roll Attitude	±180°	±2°	2	0.5°.
Radio Transmitter Keying	On-Off (Discrete)		1	0.25 sec
Power in Each Engine: Free Power Turbine Speed *and* Engine Torque.	0–130% (power Turbine Speed) Full range (Torque).	±2%	1 speed 1 torque (per engine).	0.2% [1] to 0.4% [1]
Main Rotor Speed	0–130%	±2%	2	0.3% [1]
Altitude Rate	±6,000 ft/min	As installed	2	0.2% [1]
Pilot Input—Primary Controls (Collective, Longitudinal Cyclic, Lateral Cyclic, Pedal) [3].	Full range	±3%	2	0.5% [1]
Flight Control Hydraulic Pressure Low.	Discrete, each circuit		1	
Flight Control Hydraulic Pressure Selector Switch Position, 1st and 2nd stage.	Discrete		1	
AFCS Mode and Engagement Status.	Discrete (5 bits necessary).		1	
Stability Augmentation System Engage.	Discrete		1	
SAS Fault Status	Discrete		0.25	
Main Gearbox Temperature Low.	As installed	As installed	0.25	0.5% [1]
Main Gearbox Temperature High.	As installed	As installed	0.5	0.5% [1]
Controllable Stabilator Position.	Full Range	±3%	2	0.4% [1].
Longitudinal Acceleration	±1g	±1.5% max range excluding datum error of ±5%.	4	0.01g.
Lateral Acceleration	±1g	±1.5% max range excluding datum of ±5%.	4	0.01g.
Master Warning	Discrete		1	
Nav 1 and 2 Frequency Selection.	Full range	As installed	0.25	
Outside Air Temperature	−50 °C to +90 °C	±2° c	0.5	0.3° c

[1] Per cent of full range.
[2] This column applies to aircraft manufactured after October 11, 1991.
[3] For all aircraft manufactured on or after December 6, 2010, the sampling interval per second is 4.

[Doc. No. 25530, 53 FR 26154, July 11, 1988; 53 FR 30906, Aug. 16, 1988; Amdt. 135–113, 73 FR 12571, Mar. 7, 2008; 73 FR 15281, Mar. 21, 2008; Amdt. 135–121, 75 FR 17047, Apr. 5, 2010]

APPENDIX F TO PART 135—AIRPLANE FLIGHT RECORDER SPECIFICATION

The recorded values must meet the designated range, resolution and accuracy requirements during static and dynamic conditions. Dynamic condition means the parameter is experiencing change at the maximum rate attainable, including the maximum rate of reversal. All data recorded must be correlated in time to within one second.

Parameters	Range	Accuracy (sensor input)	Seconds per sampling interval	Resolution	Remarks
1. Time or Relative Time Counts [1].	24 Hrs, 0 to 4095.	±0.125% Per Hour.	4	1 sec	UTC time preferred when available. Counter increments each 4 seconds of system operation.
2. Pressure Altitude.	−1000 ft to max certificated altitude of aircraft. +5000 ft.	±100 to ±700 ft (see table, TSO C124a or TSO C51a).	1	5′ to 35″	Data should be obtained from the air data computer when practicable.